# Nuclear Theory and Nuclear Experiment E-print Archives: *Science Citation Index* - based Analysis

E. R. Prakasan, Anil Sagar, Anil Kumar, Lalit Mohan, C. R. Gaderao,
Ganesh Surwase, Sandeep Kadam, V. L. Kalyane, and Vijai Kumar
Library & Information Services Division,
Bhabha Atomic Research Centre, Mumbai – 400 085 (India)
E-mail: prak@magnum.barc.ernet.in

## Abstract

*The paper is based upon a study on the citations in the Science Citation Index (1992-2002) to the e-print archives of Los Alamos National Laboratory on the subject categories 'nucl-th' (nuclear theory) and 'nucl-ex' (nuclear experiment). The trend of growth of e-print archives and citing pattern of e-print archives are studied. The paper has also identified the highly cited e-print archives and the highly citing journals. The study shows the growing use of e-print archives as the knowledge-generating system for fast communication of results and ideas, and their quick use.*

Key words: E-Print Archives, Science Citation Index, Pre-Prints, Nuclear Theory, Repository , Citation.

## Introduction

Preprints can be any manuscript, which is to be peer-reviewed and awaiting publication in a formal source. Preprints can be manuscripts submitted for publication, but for which no publication decision has been reached [Luce, 2001]. Even, the documents that have not been sent for publication can also be termed as preprints. Holdings of electronic versions of preprints are generally known as e-print archives. Unlike the familiar paper preprints, the e-prints can be, and often are, updated as revised versions by the author at any time, before or after the peer-review process. In some subjects, where rapid transmission of knowledge is critical, electronic dissemination of preprints is highly desirable, with subsequent traditional publication becoming almost a formality [Langer, 2000].

Researchers involved in the fundamental research (especially in nuclear sciences) are experiencing the usage benefits of e-print archives for faster communication of their ideas than ever before through paper based-preprints, fax or other telecommunication modes. Developed in 1991 at the Los Alamos National Laboratory (LANL), the 'arXiv' e-print server was the first widely successful automated electronic archive for research papers in physics and related disciplines. Any researcher can post their electronic preprints on this site and each posting gets an e-print archive number [Prakasan, et al., 2003a].

The e-print archive number assigned by the LANL preprint server provides a standardized common number for preprints that allows the item to be uniquely identified by the users (author/s, staff of LANL, free land peer reviewers, information analysts etc.). LANL's alpha numeric code provides broad subject categorization, year indicator, and accession number [Youngen, 1998]. A typical example of e-print archive number is:

gr-qc/9911092

where 'gr-qc' stands for General Relativity/Quantum Cosmology, '99' for the posted year 1999, 11 for the month November and '092' for the accession number.

The e-print archive numbers are useful for citing the work, as well as serving as a common link between databases consisting of bibliographic information and the full text of the article. The alphabetical codes used for the nuclear science subject category are 'nucl-th' (nuclear theory) and 'nucl-ex' (nuclear experiment).

The repository of the subject category 'nucl-th' is intended for nuclear theory papers that investigate: (a) Nuclear Structure and Dynamics (including but not limited to collective descriptions of classical nuclear structure such as the shell model, its extensions (IBM), deformed nuclei; direct calculations using realistic interactions; boson exchange potential models; extensions to hypernuclei), (b) Quark Structure of Matter (including but not limited to quark and chiral descriptions of mesons, baryons, nuclei, nuclear matter, and hypernuclei; baryon-baryon [nucleon, delta, hyperon], meson-baryon and meson-meson scattering amplitudes from quark models, chiral perturbation theory, boson exchange models or effective potentials), (c) Phases of Nuclear Matter (including but not limited to

quark-gluon plasma, warm and hot nuclei, strangelets), (d) Fundamental Interactions (in nuclei or at low energies) (including but not limited to weak and electromagnetic interactions [and exotic extensions thereof] of nuclei and mesons including lepton scattering; nuclear and mesonic decays), and (e) Nuclear Astrophysics (including neutrino interactions and effects on stellar development, supernovae). This category also includes theoretical predictions for experiments on: (i) Baryon- meson- electron- photon- muon- and neutrino- scattering amplitudes on nuclei (including A=1 and meson ` targets' ) at all energies, (ii) Strong, electromagnetic and weak decays of nuclei, baryons and mesons, (iii) Light- heavy- and radioactive-ion scattering at all energies, and (iv) Properties of nuclear ground and excited states.

The repository of the subject category 'nucl-ex' is intended for nuclear experiments that investigate: (a) Nuclear Structure and Dynamics, (b) Quark Structure of Matter, (c) Phases of Nuclear Matter, (d) Fundamental Interactions (in nuclei or at low energies) and (e) Nuclear Astrophysics. This category also includes: (i) Baryon- meson- electron- photon- muon- and neutrino- scattering on nuclei (including A=1 and meson ` targets' where appropriate) at all energies, (ii) Strong, electromagnetic and weak decays of nuclei, baryons and mesons, (iii) Light- heavy- and radioactive- ion scattering at all energies, and (iv) Properties of nuclear ground and excited states.

Scientists, publishers and information professionals alike now accept the e-print archives as primary information sources (Prakasan, et al., 2003b). Scientists started to utilize these emerging sources of information and to cite e-print archives in their research publications. This has also been the case in the ISI *Science Citation Index* (*SCI*)/*Web of Science* from the year 1994 onwards.

A typical entry of a cited reference of e-print archives in the *SCI* is:

FILIMONOV-K-0000-NUCL-EX0109017

where FILIMONOV-K is author of the e-print archive, 0000 is the code followed for e-print archives in *SCI* database instead of the publication year for journal articles, conference papers etc., and NUCL-EX0109017 is the e-print archive number.

The objectives of this paper where the main focus was on e-print archives of LANL on the subject categories 'nuclear theory (nucl-th)' and 'nuclear experiment (nucl -ex)' were:

- to document the growing trends of e-print archives ;
- to document the citing pattern of e-print archives;
- to identify the highly cited e-print archives;
- to depict citing pattern (before and after publishing); and
- to identify the highly citing sources.

## Materials and Methods

The year-wise numbers of postings of e-print archives in both the 'nucl-th' and 'nucl-ex' categories were noted down from the site http://www.arxiv.org to document the growth pattern. The study was restricted to the e-print archives posted during the period 1992-2002 in both the categories. The citations to the e-print archives on the 'nucl-th' and 'nucl-ex' categories were retrieved from *Science Citation Index* (1992-2002). Normal keyword search on the field 'cited reference/author' of *SCI* was used to retrieve the items. The total number of records retrieved and analysed were 5106.

## Results and Discussion

*Growth of e-print archives vs citations*

Year-wise growth in number of 'nucl-th' and 'nucl-ex' e-print archives and the citations are presented in Table 1. The number of e-print archives in the 'nucl-th' and 'nucl-ex' subject categories on LANL have overall rising trend every year. The time span for posting first 50 % of the total number of e-print archives on the category 'nucl-th' was seven years where as latest 50 % took only four years. The time span for posting first 50 % of the total number of e-print archives on the category 'nucl-ex' was seven years whereas latest 50 % took only two years. The year-wise growth of e-print archives posted for these two categories are depicted in Figure 1. This figure also gives the plot of cumulative citations of e-print archives as per SCI in these two subject categories. These curves indicate the recognition of e-print archives by the research community in these two sectors of nuclear science which means that the scientists working in these areas are undergoing the transition to electronic publications.

Table 1: Number of 'nucl-th' and 'nucl-ex' e-print archives and citations received in the *SCI*.

| Year | nucl-th | | nucl-ex | |
|---|---|---|---|---|
| | No. of e-prints | No. of citations | No. of e-prints | No. of citations |
| 1992 | 49 | 0 | 0 | 0 |
| 1993 | 302 | 0 | 0 | 0 |
| 1994 | 390 | 3 | 4 | 0 |
| 1995 | 517 | 42 | 24 | 4 |
| 1996 | 625 | 98 | 57 | 5 |
| 1997 | 805 | 209 | 69 | 9 |
| 1998 | 977 | 524 | 110 | 73 |
| 1999 | 1035 | 893 | 174 | 90 |
| 2000 | 975 | 1036 | 174 | 154 |
| 2001 | 942 | 1049 | 245 | 191 |
| 2002 | 1047 | 976 | 295 | 366 |
| Total | 7664 | 4830 | 1152 | 892 |

Among the total number of 1152 'nucl-ex' e-print archives posted during the period of study, 309 (26.82 %) have been cited. Whereas among the total number of 7664 'nucl-th' e-print archives posted, 2033 (26.47 %) have got citations. As the e-print archives are accepted as a genuine source of information by the researchers, citing these are also accepted. Authors started to cite 'nucl-th' e-print archives in the year 1994 and it has got three citations. Whereas 'nucl-ex' got citations in the year 1995 and it was only four citations. The numbers of citations in the year 2002 were 976 (nucl-th) and 366 (nucl-ex).

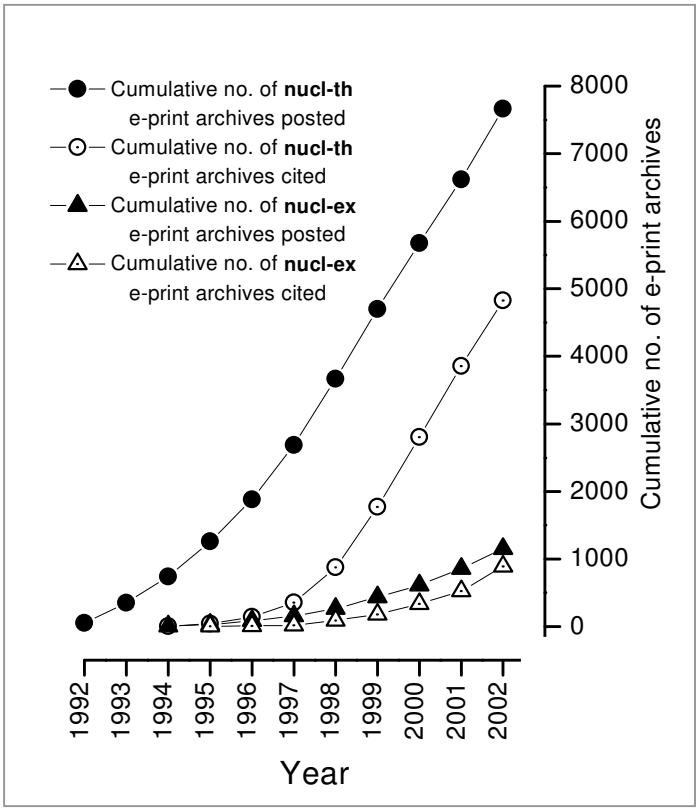

Figure 1: Growth of 'nucl-th' and 'nucl-ex' e-print archives

The distribution of citations to 'nucl-th' and 'nucl-ex' e-print archives before publishing in the *SCI* is documented in Table 2. There were two 'nucl-th' e-print archives with more than 50 citations. The average citations in both these categories were 2.38 (nucl-th) and 2.89 (nucl-ex). Highly cited fifteen e-print archives in 'nucl-th' and 'nucl-ex' categories with sources in which these were published later on are listed in Table 3 and Table 4 respectively. The citations to these fifteen e-print archives in both categories after publishing are also given. The topmost e-print archives have received immediate recognition by citations to the e-print archives. When the e-print archives get reprinted in the formal channels of communications like journals, more citations are given to these published sources as compared to the e-print archives which is presented in Figure 2 for the highly cited e-print archives from 'nucl-th' and 'nucl-ex' categories.

Table 2: Distribution of citations to 'nud-th' and 'nucl-ex' e-print archives (before publishing in formal sources) in the *SCI* (1994-2002)

| No. of citations | nucl-th | | | nucl-ex | | |
|---|---|---|---|---|---|---|
| | No. of e-print archives (f) | Average no. of citations (x) | Total no. of citations (f·x) | No. of e-print archives (f) | Average no. of citations (x) | Total no. of citations (f·x) |
| 50-60 | 2 | 53.00 | 106 | 0 | 0.00 | 0 |
| 41-50 | 0 | 0.00 | 0 | 0 | 0.00 | 0 |
| 31-40 | 2 | 34.50 | 69 | 1 | 37.00 | 37 |
| 21-30 | 2 | 22.00 | 44 | 5 | 27.20 | 136 |
| 11-20 | 36 | 13.64 | 491 | 8 | 13.75 | 110 |
| 1-10 | 1987 | 2.07 | 4120 | 295 | 2.06 | 609 |
| Total | 2029 | 2.38 | 4830 | 309 | 2.89 | 892 |

Table 3: Highly cited 15 ' nucth' eprint archives in the *SCI* (1994-2002)

| E-print archive code number (Title of article and Authors) | Published source title (reprinted) | No. of citations | | |
|---|---|---|---|---|
| | | Before publishing | After publishing | Total |
| **nucl-th/9907041** Gaps and Critical Temperature for Color superconductivity by R.D. Pisarski, D.H. Rischke | *Phys. Rev. D* 61 (2000) 051501 (pp. 01-04) | 22 | 68 | 90 |
| **nucl-th/ 0012025** Hadron production in nuclear collisions at RHIC and high density QCD by D. Kharzeev, M. Nardi | *Phys. Lett. B* 507 (2001) pp. 121-128 | 18 | 49 | 67 |
| **nucl-th/0002042** Evidence for a New State of Matter: An Assessment of the Results from the CERN Lead Beam Programme by Ulrich Heinz, Maurice Jacob | CERN Press Release of February 10, 2000 | 53 | 12 | 65 |
| **nucl-th/9903023** Superfluidity in a Model of Massless Fermions Coupled to Scalar Bosons by R.D. Pisarski, D.H. Rischke | *Phys. Rev. D* 60 (1999) 094013 (pp. 01-19) | 15 | 45 | 60 |
| **nucl-th/9706029** How to Renormalize the Schrodinger Equation by Peter Lepage | Lectures given at the VIII Jorge Andre Swieca Summer School (Brazil, 1997). | 53 | 0 | 53 |
| **nucl-th/0008014** Energy and Centrality Dependence of Rapidity Densities at RHIC by Xin-Nian Wang, Mikols Gyulassy | *Phys. Rev. Lett.* 86 (2001) pp. 3496-3499; LBL-45309 | 19 | 32 | 51 |
| **nucl-th/9506035** Effective Field Theories by David B. Kaplan | Seventh Summer School in Nuclear Physics, Seattle June 19-30 1995; DOE/ER/40561-205-INT95-00-92 | 34 | 9 | 43 |
| **nucl-th/9802038** Chiral Perturbation Theory Approach to NN Scattering Problem by J. Gegelia | Contribution to Workshop on Perturbative Methods in Quantum Field Theory, Adelaide, Australia, 2-13 February 1998 | 35 | 1 | 36 |
| **nucl-th/9806028** Are Pions Perturbative in Effective Field Theory? by J. Gegelia | Unknown publication details | 22 | - | 22 |
| **nucl-th/9907096** Reconstructing the Freeze-out State in Pb+Pb Collisions at 158AGeV/c by Boris Tomasik, Urs Achim Wiedemann, Ulrich Heinz | *Heavy Ion Phys* 17(2003) pp. 105-143; TPR-99-12,CERN-TH/99-215 | 20 | 2 | 22 |
| **nucl-th/9906050** Parity violation through color superconductivity by R.D. Pisarski, D.H. Rischke | Proc. of QM' 99 conference; RBRC preprint | 18 | 0 | 18 |
| **nucl-th/0008064** From Hadrons to Nuclei: Crossing the Border by Silas R. Beane, Paulo F. Bedaque, Wick C. Haxton, etal | NT@UW-00-021; DOE-ER-41132-101 | 18 | 0 | 18 |
| **nucl-th/9903018** Hadron production in Pb-Pb collisions at 158A GeV by Johann Rafelski, Jean Letessier | Unknown publication details | 17 | - | 17 |
| **nucl-th/0110037** A Hydrodynamic Description of Heavy Ion Collisions at the SPS and RHIC by D. Teaney, J. Lauret, E.V. Shuryak | Unknown publication details | 16 | - | 16 |
| **nucl-th/9807087** Elastic scattering analyses and dispersion relation constraints by R.A. Arndt, I.I. Strakovsky, R.L. Workman, M.M. Pavan | Unknown publication details | 16 | - | 16 |

Table 4: Highly cited 15 'nucl-ex' e-print archives in the *SCI* (1994-2002)

| E-print archive code number (Title of article and Authors) | Published source title (reprinted) | No. of citations | | |
|---|---|---|---|---|
| | | Before publishing | After publishing | Total |
| **nucl-ex/9709006** Evidence for nu_mu -> nu_e Neutrino Oscillations from LSND by C. Athanassopoulos, L.B. Auerbach, R.L. Burman, etal (LSND Collaboration) | *Phys. Rev. Lett.* 81 (1998) pp. 1774-1777 | 13 | 312 | 325 |
| **nucl-ex/0106015** Measurement of the rate of _e + d ! p + p + e_ interactions produced by 8B solar neutrinos at the Sudbury Neutrino Observatory by Q.R. Ahmad, R.C. Allen, T.C. Andersen, etal (SNO Collaboration) | *Phys. Rev. Lett.* 87 (2001) 071301 (pp. 01-06) | 37 | 244 | 281 |
| **nucl-ex/9706006** Evidence for nu_mu -> nu_e Oscillations from Pion Decay in Flight Neutrinos by C. Athanassopoulos, L.B. Auerbach, R.L. Burman, etal (LSND Collaboration) | *Phys. Rev. C* 58 (1998) pp. 2489-2511 | 30 | 123 | 153 |
| **nucl-ex/9910016** The Sudbury Neutrino Observatory by J. Boger, R.L. Hahn, J.K. Rowley, etal (SNO Collaboration) | *Nucl. Instrum. Meth. A* 449 (2000) pp. 172-207 | 24 | 49 | 73 |
| **nucl-ex/0204008** Direct Evidence for Neutrino Flavor Transformation from Neutral-Current Interactions in the Sudbury Neutrino Observatory by Q.R. Ahmad, R.C. Allen, T.C. Andersen, etal (SNO Collaboration) | *Phys. Rev. Lett.* 89 (2002) 011301 (pp. 01-06) | 26 | 42 | 68 |
| **nucl-ex/0204009** Measurement of Day and Night Neutrino Energy Spectra at SNO and Constraints on Neutrino Mixing Parameters by Q.R. Ahmad, R.C. Allen, T.C. Andersen, J.D. Anglin, etal (SNO Collaboration) | *Phys. Rev. Lett.* 89 (2002) 011302 (pp. 01-05) | 27 | 29 | 56 |
| **nucl-ex/9909007** Measurement of Differences Between J/Psi and Psi' Suppressior in p-A Collisions by M.J. Leitch, W.M. Lee, M.E. Beddo, etal | *Phys. Rev. Lett.* 84 (2000) pp. 3256-3260 | 11 | 21 | 32 |
| **nucl-ex/9711003** Reconstructing azimuthal distributions in nucleus-nucleus collisions by Jean-Yves Ollitrault (Saclay) | Unknown publication details | 29 | - | 29 |
| **nucl-ex/0108009** Energy dependence of particle multiplicities in central Au+Au collisions by B.B. Back, M.D. Baker, D.S. Barton, et al., (PHOBOS Collaboration) | *Phys. Rev. Lett.* 88 (2002) 022302 (pp. 01-04) | 15 | 8 | 23 |
| **nucl-ex/9706011** A letter of intent for an experiment to measure nu_mu to nu_e oscillations and nu_mu disappearance at the Fermilab Booster (BooNE) by E. Church, I. Stancu, G. J. VanDalen, etal | LA-UR-97-2120 | 16 | 6 | 22 |
| **nucl-ex/0006007** Direct Photon Production in 158 A GeV 208Pb + 208Pb collisions by M.M. Aggarwal, A. Agnihotri, Z. Ahammed, etal (WA98 Collaboration) | Submitted to *Phys. Rev. C* (Unknown publication details) | 19 | - | 19 |
| **nucl-ex/9902012** Search for Quadrupole Strength in the Electro-excitation of the Delta(1232) by C. Mertz, C. Vellidis, R. Alarcon, etal | *Phys. Rev. Lett.* 86 (2001) pp. 2963-2966 | 12 | 7 | 19 |
| **nucl-ex/0008005** The RHIC Zero Degree Calorimeter by Clemens Adler, Alexei Denisov, Edmundo Garcia, etal | *Nucl. Instrum. Meth. A* 470 (2001) pp. 488-499 | 13 | 5 | 18 |
| **nucl-ex/0105011** Centrality Dependence of Charged Particle Multiplicity at Mid-Rapidity in Au+Au Collisions at sqrt(s_NN) = 130 GeV B.B. Back, M.D. Baker, D.S. Barton etal (PHOBOS Collaboration) | *Phys. Rev. C* 65 (2002) 031901 (pp. 01-04) | 10 | 5 | 15 |
| **nucl-ex/0012008** Centrality Dependence of Charged Particle Multiplicity in Au-Au Collisions at sqrt(s_NN)=130 GeV by K. Adcox, S. S. Adler, N. N. Ajitanand, etal (PHENIX Collaboration) | *Phys. Rev. Lett.* 86 (2001) pp. 3500-3505 | 11 | 0 | 11 |

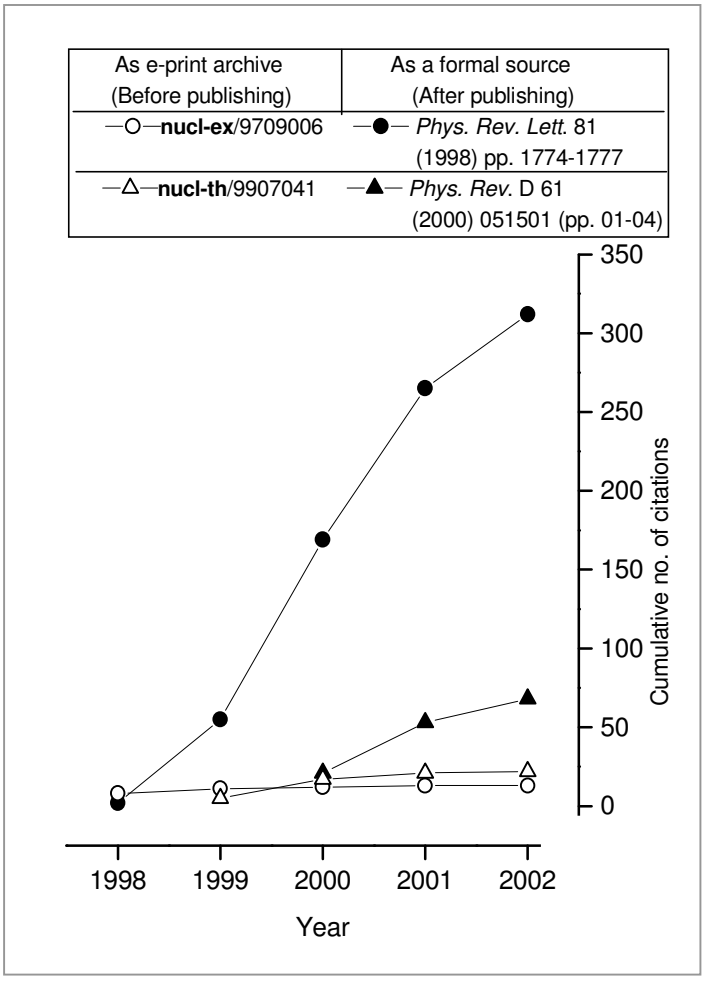


Figure 2: Citing pattern (before and after publishing) of highest cited e-print archives in the *SCI*.

*Sources citing e-print archives*

There were three journal articles in which the list of references contains five e-print archives. There were: 23 journal articles in which the list of references contains four e-print archives; 77 journal articles with three e-print archives; 381 journal articles with two e-print archives; and 4622 journal articles cited only one e-print archives.

Table 5 documents the sources citing e-print archives during 1994-2002 in the *SCI* with their publishing country and Impact Factor. Most of the journals, which cited e-print archives, are very important and influential in their respective domains. The journals originating from countries like USA, The Netherlands and UK are forerunners in citing the e-print archives.

The citing pattern of top five journals (*Physical Review C*; *Nuclear Physics A*; *Physics Letters B*; *Physical Review Letters* and *Journal of Physics G*) is depicted in Figure 3.

Table 5: Sources citing 'nucl-th' and 'nucl-ex' e-print archives in the *SCI* (1994-2002)

| Sl. No. | Citing Sources (Country of Publishing) | Impact Factor (2001) | Number of citations | | |
|---|---|---|---|---|---|
| | | | nucl-th | nucl-ex | Total |
| 1 | *Nuclear Physics A* (The Netherlands) | 2.740 | 1186 | 140 | 1326 |
| 2 | *Physical Review C* (USA) | 2.695 | 1098 | 180 | 1278 |
| 3 | *Physics Letters B* (The Netherlands) | 4.377 | 658 | 178 | 836 |
| 4 | *Physical Review Letters* (USA) | 6.668 | 238 | 73 | 311 |
| 5 | *Journal of Physics G* (UK) | 1.182 | 227 | 39 | 266 |
| 6 | *Physical Review D* (USA) | 4.363 | 194 | 34 | 228 |
| 7 | *Acta Physica Polonica B* (Poland) | 0.574 | 139 | 40 | 179 |
| 8 | *European Physical Journal A* (Germany) | 1.725 | 130 | 14 | 144 |
| 9 | *Physics of Atomic Nuclei* (USA) | 0.463 | 122 | 15 | 137 |
| 10 | *Progress in Particle and Nuclear Physics* (UK) | 2.840 | 100 | 17 | 117 |
| 11 | *European Physical Journal C* (Germany) | 5.194 | 70 | 20 | 90 |
| 12 | *Nuclear Physics B-Proceedings Supplements* (The Netherlands) | 0.947 | 50 | 24 | 74 |
| 13 | *Physics Reports* (The Netherlands) | 8.341 | 59 | 10 | 69 |
| 14 | *Nuclear Physics B* (The Netherlands) | 6.226 | 41 | 22 | 63 |
| 15 | *Czechoslovak Journal of Physics* (Czech Republic) | 0.345 | 46 | 9 | 55 |
| 16 | *International Journal of Modern Physics A* (Singapore) | 1.541 | 25 | 6 | 31 |
| 17 | *Pramana-Journal of Physics* (India) | 0.283 | 23 | 8 | 31 |
| 18 | *Progress of Theoretical Physics Supplement* (Japan) | 0.635 | 29 | 2 | 31 |
| 19 | *Modern Physics Letters A* (Singapore) | 1.119 | 28 | 2 | 30 |
| 20 | *Progress of Theoretical Physics* (Japan) | 1.681 | 25 | 4 | 29 |
| 21 | *Few-Body Systems* (Austria) | 1.857 | 26 | 2 | 28 |
| 22 | *Journal of Physics A* (UK) | 1.542 | 27 | 1 | 28 |
| 23 | *Annual Review of Nuclear and Particle Science* (USA) | 6.690 | 23 | 4 | 27 |
| 24 | *Physical Review A* (USA) | 2.810 | 22 | 0 | 22 |
| 25 | *Physica Scripta* (Sweden) | 0.772 | 19 | 2 | 21 |
| 26 | *Communications in Theoretical Physics* (The Netherlands) | 0.397 | 20 | 0 | 20 |
| 27 | *Nuclear Instruments & Methods in Physics Research Section A* (The Netherlands) | 1.260 | 11 | 9 | 20 |
| 28 | *Annals of Physics* (USA) | 1.968 | 18 | 1 | 19 |
| 29 | *Advances in Nuclear Physics* (USA) | 6.667 | 18 | 0 | 18 |
| 30 | *Physical Review E* (USA) | 2.235 | 14 | 0 | 14 |
| 31 | *Journal of the Korean Physical Society* (Republic of Korea) | 0.550 | 11 | 1 | 12 |
| 32 | *Zeitschrift fur Physik A* (Germany) | 1.730 | 10 | 2 | 12 |
| 33 | *Jetp Letters* (USA) | 1.377 | 7 | 4 | 11 |
| 34 | *Astrophysical Journal* (USA) | 5.921 | 8 | 2 | 10 |
| 35 | *Chinese Physics Letters* (China) | 0.813 | 10 | 0 | 10 |
| 36 | *Journal of Experimental and Theoretical Physics* (USA) | 1.156 | 5 | 4 | 9 |
| 37 | *Nuovo Cimento della Societa Italiana di Fisica A* (Italy) | 0.697 | 8 | 1 | 9 |
| 38 | *Foundations of Physics* (USA) | 0.425 | 7 | 1 | 8 |
| 39 | *Izvestiya Akademii Nauk Seriya Fizicheskaya* (Russian Federation) | 0.880 | 8 | 0 | 8 |
| 40 | *Reports on Progress in Physics* (UK) | 8.879 | 5 | 1 | 6 |
| 41 | *Australian Journal of Physics* (Australia) | 0.657 | 4 | 1 | 5 |
| 42 | *Europhysics Letters* (Switzerland) | 2.340 | 4 | 1 | 5 |
| 43 | *Reviews of Modern Physics* (USA) | 12.762 | 3 | 2 | 5 |
| 44 | *Revista Mexicana de Fisica* (Mexico) | 0.154 | 5 | 0 | 5 |
| 45 | *Classical and Quantum Gravity* (UK) | 2.041 | 3 | 1 | 4 |
| 46 | *International Journal of Modern Physics B* (Singapore) | 0.523 | 4 | 0 | 4 |
| 47 | *Rivista del Nuovo Cimento* (Italy) | 1.333 | 3 | 1 | 4 |
| 48 | *Zeitschrift fur Physik C* (Germany) | NA | 4 | 0 | 4 |
| 49 | *Astronomy & Astrophysics* (Germany) | 2.281 | 2 | 1 | 3 |
| 50 | *Chinese Journal of Physics* (China) | 0.365 | 2 | 1 | 3 |
| 51 | *Journal of High Energy Physics* (Italy) | 8.664 | 1 | 2 | 3 |
| 52 | *Annals of the New York Academy of Sciences* (USA) | 1.593 | 2 | 0 | 2 |
| 53 | *Astroparticle Physics* (The Netherlands) | 4.110 | 0 | 2 | 2 |
| 54 | *Chaos Solitons & Fractals* (UK) | 0.839 | 2 | 0 | 2 |

Continued

Continuation of Table 5

| Sl. No. | Citing Sources (Country of Publishing) | Impact Factor (2001) | Number of citations | | |
|---|---|---|---|---|---|
| | | | nucl-th | nucl-ex | Total |
| 55 | *Hyperfine Interactions* (USA) | 0.634 | 1 | 1 | 2 |
| 56 | *Journal of Physics B* (UK) | 2.046 | 2 | 0 | 2 |
| 58 | *Physica A* (Germany) | 1.295 | 2 | 0 | 2 |
| 59 | *Physical Review B* (USA) | 3.070 | 2 | 0 | 2 |
| 60 | *Physics Letters A* (USA) | 1.220 | 2 | 0 | 2 |
| 61 | *Physics-Uspekhi* (The Netherlands) | NA | 2 | 0 | 2 |
| 62 | *Zhurnal Eksperimentalnoi I Teoreticheskoi Fiziki* (Russian Federation) | NA | 2 | 0 | 2 |
| 63 | *American Journal of Physics* (USA) | 0.620 | 0 | 1 | 1 |
| 64 | *Annalen Der Physik* (Germany) | 1.590 | 1 | 0 | 1 |
| 65 | *Astronomy Letters-A* (Russian Federation) | 1.015 | 1 | 0 | 1 |
| 66 | *Atomic Data and Nuclear Data Tables* (USA) | 3.194 | 0 | 1 | 1 |
| 67 | *Canadian Journal of Physics* (USA) | 0.623 | 0 | 1 | 1 |
| 68 | *General Relativity and Gravitation* (UK) | 0.773 | 1 | 0 | 1 |
| 69 | *Ieee Transactions on Nuclear Science* (USA) | 0.771 | 0 | 1 | 1 |
| 70 | *International Journal of Modern Physics D* (Singapore) | 1.242 | 1 | 0 | 1 |
| 71 | *Journal of Mathematical Physics* (UK) | 1.151 | 1 | 0 | 1 |
| 72 | *Nonlinear Analysis-Theory Methods & Applications* (UK) | 0.406 | 1 | 0 | 1 |
| 73 | *Philosophical Transactions of the Royal Society of London Series A* (UK) | 1.471 | 1 | 0 | 1 |
| 74 | *Physics Today* (USA) | 4.790 | 1 | 0 | 1 |
| 75 | *Review of Scientific Instruments* (USA) | 1.352 | 0 | 1 | 1 |
| 76 | *Space Science Reviews* (The Netharlands) | 1.601 | 0 | 1 | 1 |
| 77 | *Science* (USA) | 23.329 | 1 | 0 | 1 |
| 78 | *Springer Tracts in Modern Physics* (Germany) | 0.446 | 1 | 0 | 1 |
| 79 | *Uspekhi Fizicheskikh Nauk* (Russian Federation) | NA | 1 | 0 | 1 |
| 80 | *Zeitschrift fur Naturforschung Section A* (Germany) | 0.746 | 1 | 0 | 1 |
| 1-80 | All sources total | - | 4830 | 892 | 5722 |

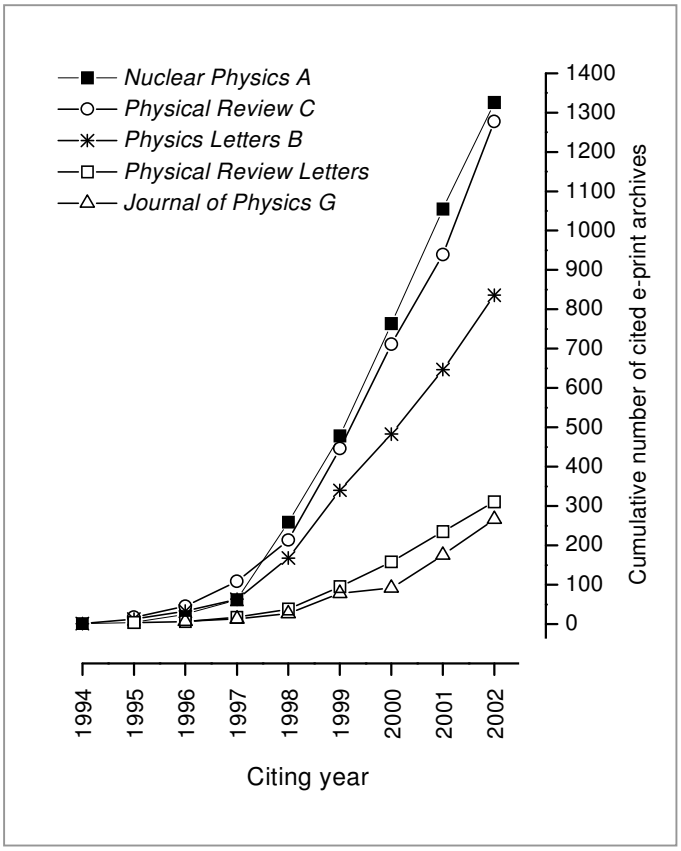


Figure 3: Top five journals citing 'nucl-th' and 'nucl-ex' e-print archives in the *SCI*.

## Conclusion

The citations to the e-print archives are very interesting to the information analysts and scientists as well. The sources publishing (reprinting of e-prints) as well as citing e-print archives are very reputed and influential in the respective fields. The citing pattern of e-print archives and the respective reprints of the same e-print archives establishes the importance of its thought contents, which are spearheading the leading edge of high research activity domains.

## Acknowledgement

We are grateful to John Willinsky, Pacific Press Professor of Literacy and Technology, University of British Columbia, Vancouver, BS, Canada for the peer-review and suggestions to conduct research on e-prints or pre-prints in the digital era [Willinsky , 2003].

## References

Luce, R.E. (2001) E-prints intersect the digital library: inside the Los Alamos arXiv. *Issues in Science and Technology Librarianship*, 29 [http://www.library.ucsb.edu/istl/01-winter/article3.html].

Langer, J. (2000) Physicists in the new era of electronic publishing. *Physics Today*, **53**(8), 2000, pp. 35-38. [http://www.aip.org/pt/vol-53/iss-8/p35.html].

Prakasan, E. R.; Anil Kumar; Anil Sagar; Lalit Mohan; Singh, Sanjay Kumar; Kalyane, V. L. and Vijai Kumar (2003a) Content analysis of E-Print Archives. *http://arxiv.org/abs/physics/0308107* (LANL e-print archive).

Prakasan, E. R.; Anil Kumar; Anil Sagar; Lalit Mohan; Kalyane, V. L.; Vijai Kumar and Upadhye, Rekha P. (2003b) E-Print archives: A fast emerging mode of electronic communication of pre-prints. *BOSLA One Day Seminar on Resource Management: Proceedings Volume*, Eds. Muttayya Koganuramath, B.S. Kademani, Satish Kanamadi and Savita Rao. pp. 15-24.

Willinsky, John (2003) Personal communication, August 23, 2003.

Youngen, Gregory K. (1998) Citation Patterns to Electronic Preprints in the Astronomy and Astrophysics Literature. *Library and Information Services in Astronomy III*, *APS Conference Series*, 153.